INTegral

Line-Interactive
Uninterruptible Power Supply Unit

650 VA
USER'S MANUAL
MNL105-650VA-T

Power Innovations
INTERNATIONAL, INC.

READ THIS MANUAL CAREFULLY

SAVE ALL INSTRUCTIONS

This manual contains important information that you will need to operate the UPS safely and efficiently. Please read all instructions carefully before installing or operating equipment.

Keep this manual handy for easy reference.

ELECTRICAL WARNINGS

Read and follow installation instructions carefully before operating.

Applying information contained in this manual to any other product may cause injury.

The *INTegral* is registered for sale by Power Innovations International, Inc.

This manual may have been received with other products or instructional materials. If additional products or instructional materials have been ordered but have not been received, contact your reseller.

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The Standard for Perfect, Dependable Power

Version 1.0

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1—Introduction

1.1—Congratulations on Your Purchase

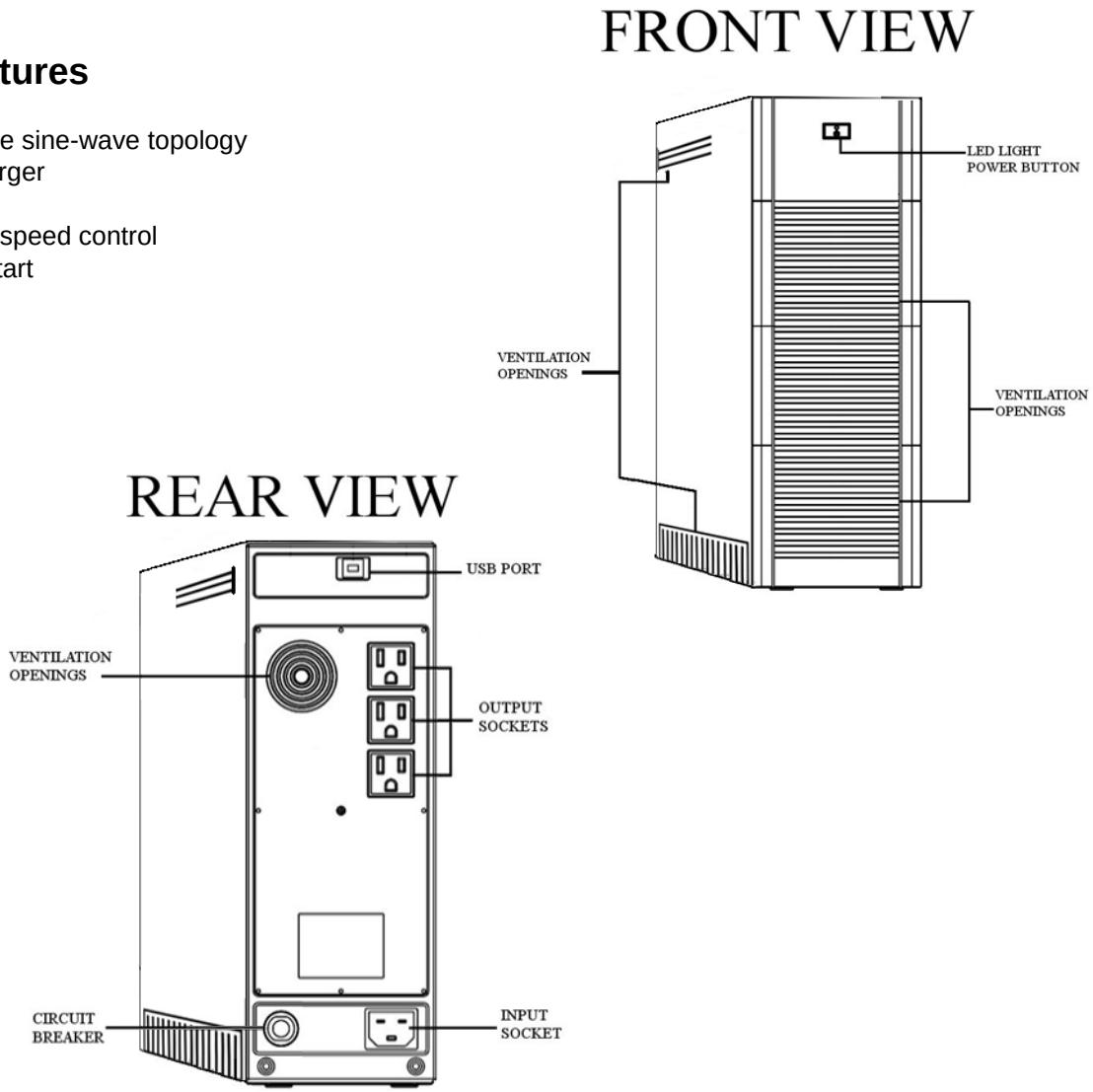
Thank you for purchasing Power Innovations' *INTegral Line-Interactive Power Supply Unit*. Power Innovations believes in the efficiency and durability of its products. The company hopes that this product will serve you well for an extended period of time.

Office equipment needs reliable, clean power. The Uninterruptible Power System (UPS) is designed to meet all computer, server and automated office equipment needs with a compact, quiet unit that operates efficiently and provides multiple interface options.

To choose the INTegral 650LED as your equipment protector is a wise investment because it supplies reliable, pure and stable power at an affordable price.

1.1.1—Key Features

- Line-interactive sine-wave topology
- Intelligent charger
- Compact size
- Intelligent fan speed control
- Battery cold start



Figures 1 and 2: Front and Rear Features of the 650 kVA *INTegral* System

1.2—Using this Manual

Read and understand this manual to make installing and operating the system as easy as possible.

This manual will show how to safely work the *INTegral*. Refer to the **Table of Contents** for a chapter-based guide.

1.2.1—Manual Conventions

1.2.1.1—Additional Advice

This manual will occasionally provide additional advice. When it is provided, this information will be enclosed by a set of lines to separate it from the rest of the text, like this:

This text does not belong with the rest.

Some of the information is very important, while other information may be good to know. To show the importance of each piece of information, the following symbols and formatting conventions are used:

WARNINGS

Denotes advice that, if not followed, could cause severe bodily harm or death due to electrical shock.

Denotes advice that, if not followed, could cause severe bodily harm or death due to other types of injury.

Cautions

Offers advice that, if not followed, may harm equipment or indirectly cause physical hazards.

Notes

Offers practical advice that may be helpful, but can be disregarded.

1.2.1.2—Type Conventions

Italic type—Used for some product acronyms

Bold type—Used to caption figures

Other noteworthy type conventions used in this manual include:

Italic type—Used to refer readers to another chapter or section.

Bold type—Used to reference figures included on the same or following pages.

1.3—Power Flow

In the *INTegral Line-Interactive UPS System*, AC utility power flows through two main loops: the AC loop and the battery charging loop (**Figure 3**).

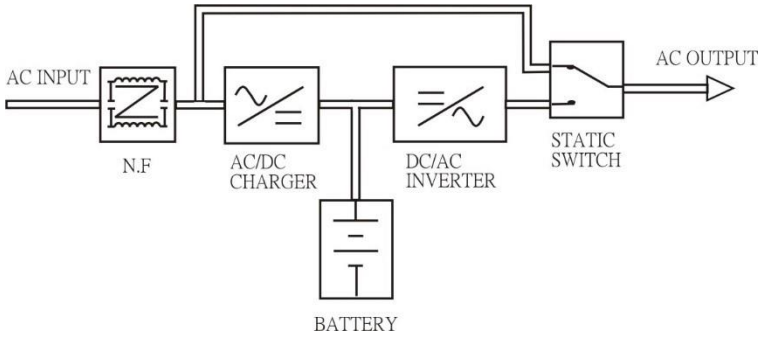


Figure 3: Power Flow for *INTegral Line-interactive system*

1.3.1—Normal Power Mode

When functioning normally, the system will power the load and charge batteries to operate when utility power is unstable. This method of battery backup provides a cost-effective means of providing reliable, uninterruptible power and increasing UPS efficiency to save you money.

In the AC loop, the power comes from AC utility input such as a wall outlet and passes through a static switch to support power to the load so long as power is clean and reliable **(Figure 4)**.

In the battery charging loop, an AC/DC converter changes AC utility input voltage into DC power, which charges the system's batteries.

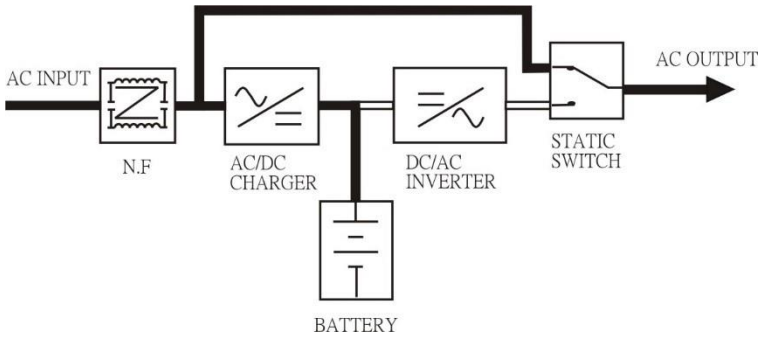


Figure 4: Power flow during Normal Power Mode

1.3.2—Battery Backup Mode

In this mode, AC output comes from the battery. Battery voltage is boosted and converted to create a clean, stable AC sine wave to power even the most sensitive equipment.

Power will pass from the battery through the DC/DC converter, DC/AC inverter, and static switch to provide output for the full length of the battery charge. Actual battery backup time will vary, depending upon initial battery charge and the current load percentage. See **6—Specifications** for backup time estimates.

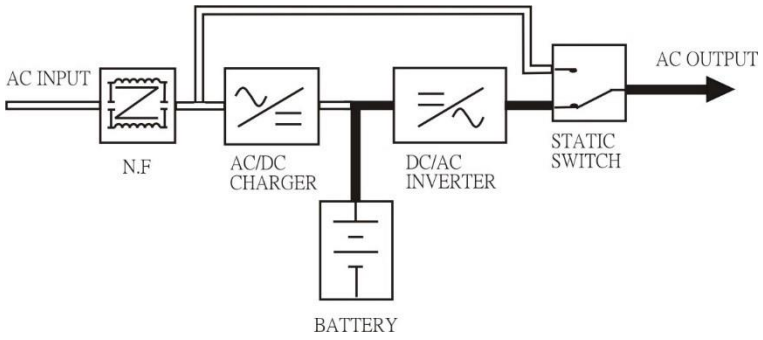


Figure 5: Power flow during Battery Backup Mode

2—Receiving and Transporting Systems

Because the UPS System supplies power, it must be handled carefully. For better product performance and to avoid injuries, follow the cautions below.

2.1—Receiving

Inspect the packaging carton and its contents for damage. If the contents have been damaged, notify your reseller immediately.

After removing the system, keep its packaging in a safe place for future use.

2.2—Transporting

Power the system down and disconnect all power cables before moving the system.

While moving the system, handle it carefully. The combined weight of the unit and its batteries can be significant.

It is recommended that the system be transported in the original packaging.

ELECTRICAL WARNING

DO NOT transport the system with power cables still attached. Failure to heed this warning could cause accidental electrical shock or death by electrocution.

Cautions

Save the original packaging and use it for transport. Using the correct packaging will prevent unnecessary harm to the system.

Note

With concerns about the manufacture or shipping of this product or its components, please contact:

Power Innovations International, Inc.
Tel: (801) 785-4123 **Fax:** (801) 785-6999
E-mail: support@power-innovations.com

3—Installing Systems

3.1—Placing Systems Correctly

3.1.1—Environmental Concerns

Install the system with the correct side facing up and on a level, even surface.

The *INTegral* will work its best if installed in a dry environment out of rain, snow, wind, and direct sunlight.

Clutter, flammable gases, and corrosive liquids may damage the unit or even constitute severe operating hazards.

Table 1: Correctly Placing the System

Environment	Ideal Placement	Avoid
Surface Grade	Level Surface	Incline
Heat	Far from direct solar or artificial heat	Heat sources or direct sunlight
Temperature	32–104 °F (0–50 °C)	Location cooler than 32 °F (0°C) or hotter than 104 °F (50°C)
Ventilation Space	Space around system	Tight spaces
Cleanliness	No dust or clutter	Dusty or cluttered places
Orientation	Right side up	Upside down or on its side

Cautions

Never place this system:

- Upside down or on an incline.
- In direct sunlight or weather.
- Near any source of natural or artificial heat.
- With less than 1” in. of ventilation room on all sides with visible ventilation holes.

Avoid locations where the system:

- Could be exposed to flammable gases or corrosive liquids.
- Will be cooler than 32°F (0°C) or hotter than 104°F (50°C).
- Will be exposed to clutter or objects that could block ventilation openings.
- Cannot ventilate.

3.1.2—System Ventilation

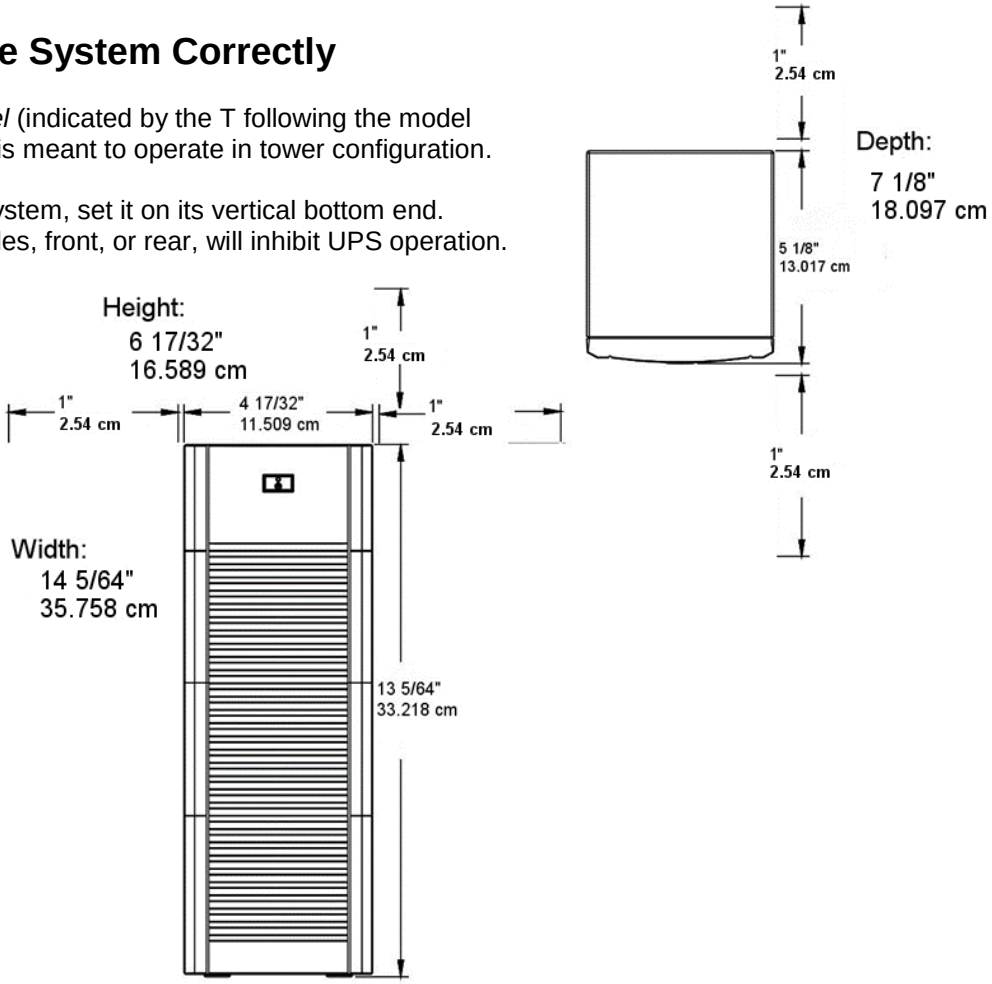
To ensure adequate ventilation, measure the place where the system will be placed to be sure that it will fit comfortably. Leaving space around the system will allow it to ventilate more efficiently.

3.1.3—Orienting the System Correctly

This system is a *tower model* (indicated by the T following the model type), meaning that the unit is meant to operate in tower configuration.

To correctly place a tower system, set it on its vertical bottom end. Placing the system on its sides, front, or rear, will inhibit UPS operation.

For more information about socket locations, refer to **1.1.1—Key Features**.



Figures 6 and 7: Ventilation clearances for the *INTegral* system

3.2—Connecting Systems

For product keys showing the socket locations and other interface connection options located on the casing, see **1.1.1—Key Features**.

1 **Connect the UPS input to an AC utility source such as a standard wall outlet.**
Be sure that the outlet has the appropriate power capacity.

2 **To connect the system to the device it will be powering, plug one end of the device's power cord into the INTegral output socket.**

Note

The output slot connects only to socket-type cords.

3 **Connect the other end of the device's power cord into the device to be powered.**

4 **Connect the monitoring UPQsoft cord to the USB port or install the UPQNet-Agent9 Mini.**

After the hardware has been connected to the port, the monitoring software is ready to be connected to a computer and configured.

Additional Manual

Connect the unit to the computer to monitor it. If UPQsoft or UPQNet-Agent9 has been ordered, another manual will be included.

3.2.1—Prestart Checklist

- ☐ The UPS is positioned correctly.
- ☐ The input cord is secured.
- ☐ The rated input voltage from the wall socket falls within the unit's safe operating range.
- ☐ System cables are placed carefully to minimize stepping and tripping hazards.

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4—Operating the System

While operating the system, be sure that it has adequate ventilation space. Be sure the operating area is left free of clutter or other objects that may block ventilation slots.

Avoid placing liquids or flammable gases near the system during operation.

Keep the system far away from sources of natural or artificial heat (ie. heaters, direct sunlight) and make sure the system is not overloaded.

During routine system operation:

- Ensure that no liquids of any kind enter the UPS system.
- Do not block off ventilation openings in the system's casing.
- Keep objects from within four (4) inches of all visible ventilation holes in the UPS. The added space helps the system ventilate.
- Do not disconnect the main cable or unplug the system from the wall outlet unless all breakers have been turned OFF. This will cause the system to switch to backup mode and drain the batteries.

ELECTRICAL WARNING

Disregarding the preceding advice may directly cause or contribute to injury.

Caution

Disregarding the preceding advice may harm the system and void the system warranty.

4.1—System Power-ON

Once the UPS is connected to the power source, the LED light will blink, indicating that the inverter can be switched ON.

Press the LED light button for two (2) seconds to turn ON the UPS. As the UPS turns ON, the green LED will illuminate solidly and the buzzer will beep twice.

Note

If the button is only briefly pressed, the light will illuminate for about five (5) seconds and then turn OFF again. The system will ventilate but not operate fully. This limited operation mode protects the system from accidentally being turned ON as it is jostled or bumped.

Make sure to press the button for at least two (2) seconds. When the system is ON, it will beep twice.

4.2—Cold Start

When the system is powered up using only battery power, the LED light will be turned OFF until the button is pressed.

To cold-start the system, press the button while the system is not connected to an AC input source. The light will illuminate, and the system will beep twice to indicate that it has been started.

After one (1) second, the system will beep a third time and the green LED light will flash. These signs indicate that no utility source has been connected and the system has been started using battery power.

4.3—Running on Battery Power

When the UPS is ON and in Battery (Backup) mode, the UPS will beep every four (4) seconds.

Note

The UPS buzzer will be enabled automatically in severe cases such as overload, overheat, or low-battery conditions.

4.4—No Outputs Connected

When power is not being transferred to the load, the UPS will beep and the green light will flash.

For more information, see **5—Troubleshooting**.

4.5—System Power OFF

Press the LED light button for two (2) seconds. The system will beep twice as it turns OFF.

4.5.1—While Connected to Input

The UPS will be disconnected from the output, with the green LED light blinking until the AC source has been disconnected.

4.5.2—While in Battery (Backup) Mode

If the system has been powered OFF, the light will turn OFF.

4.6—Storing the System

Disconnect input power from the unit's rear panel if it will not be used for extended periods of time.

If the UPS is stored for longer than two months, plug it back into a power supply for at least 24 hours to fully restore the battery charge before use.

ELECTRICAL WARNING

Keep the unit clean only by dusting it with a dry cloth. DO NOT get it overly moist, or physical damage may result.

Caution

If the UPS will be stored for long periods of time, the battery must be charged once for every 60 days of storage.

5—Maintenance and Troubleshooting

5.1—Maintenance

Very little user maintenance is required. The system has no user-serviceable internal parts.

If the system gets dirty, clean it by dusting it with a dry cloth or can of air duster while the system is OFF.

DO NOT wipe down the system with a wet cloth.

5.2—Troubleshooting Tables

If the buzzer begins to beep and the light begins to blink although utility power is normal, use the table directly below.

If AC input power is failing, use the second table.

ELECTRICAL WARNING

This system should not be serviced except by authorized individuals. Opening the case could cause accidental injury or death due to the enclosed batteries. Follow the troubleshooting guide. If troubleshooting does not fix the problem, call Power Innovations.

5.2.1—Utility Power Functioning

Scenario	Possible Cause	Try
AC utility power is normal. UPS is running normally. Buzzer is continual.	Fan is damaged.	Replacing the fan.
	Unknown.	Restarting the unit.
		Contacting Power Innovations.
AC utility power is normal, but UPS is overloaded. LED blinks and buzzer beeps every second.	System overload between 100% and 125%.	Reducing the critical load to less than 100%.
AC utility power is normal. LED blinks and buzzer beeps every half-second.	System overload between 125% and 150%.	
AC utility power is normal. LED blinks and buzzer beeps continuously.	System overload greater than 150%.	

5.2.2—Utility Power Failing

Scenario	Possible Cause	Try
AC utility power fails. The battery powers the load. Buzzer beeps every four (4) seconds.	AC utility power failure.	Reducing the critical load to extend backup time.
	AC input may not be connected correctly.	Checking the input rate.
		Checking power connection
AC utility power fails. UPS is in battery backup mode. Buzzer beeps every second.	Battery power is approaching low levels.	UPS will shut down automatically. Save data or disconnect loads soon.
AC utility power fails. UPS has shut down automatically.	Battery has run out.	UPS will restart when AC utility power is restored.

6—Specifications

Capacity (VA/Watt)			650 VA/406W
Model Type			Tower
Input	Nominal Voltage		100/110/115/120 VAC
	Voltage Range	Acceptable Voltage Range	85~150 VAC
		Frequency	45 Hz ~ 70 Hz Auto-sensing
		Boost Transfer	85/94/97.8/102 VAC ± 2%
		Boost Return	90/99/102.8/107 VAC ± 2%
		Buck Transfer	115/126/132/132 VAC ± 2%
		Buck Return	110/121/127/127 VAC ± 2%
		Low Voltage Transfer	74/81/85/89 VAC ± 2%
		Low Voltage Return	79/86/90/94 VAC ± 2%
		High Voltage Transfer	130/143/150/150 VAC ± 2%
		High Voltage Return	125/138/145/145 VAC ± 2%
Output	Voltage		100/110/115/120 VAC
	Voltage Regulation	Line Mode	±15%
		Battery Mode	< 3% RMS for entire battery voltage range
	Frequency Regulation	Line Mode	Synchronize to AC Mains
		Battery Mode	60 Hz ± 0.1 Hz
	Power Factor		0.625
	Wave Form		Pure Sine wave
	Efficiency	Line Mode	> 98%
		Battery Mode	> 80%
	Short-Circuit Protection	Line Mode	Circuit Breaker
		Battery Mode	Electronic Circuit
DC Start	Cold Start		Yes
Transfer Time	Typical		< 4 ms.
Battery	Battery Voltage		12VDC
	Battery Type		9AH (8.5AH)
	Battery Quantity		1 pce
	Backup Time: 50% Load		> 6:30
	Backup Time: 100% Load		>1:30
	Recharging current		0.1C
Control Panel	LED display		Normal (Green) Warning (Blinking)
Audible Alarm	Battery Mode		Beeping every 4 seconds
	Low Battery		Beeping every second
	UPS Fault		Beeping continuously
	Overload		Beeping twice per second
Communication Interfaces	Standard		USB
Environment	Operation Temperature		0–40 °C (32–104 °F)
	Relative Humidity		0–95% non-condensing
	Audible Noise		Less than 55 dBA (at 1m)
Physical	(WxHxD) mm		115*322*130
	(WxHxD) in		4 17/32 x 12 43/64 x 5 1./8
	Net Weight (kgs)		6.2
	Net Weight (lbs)		13 lbs 10.7 oz
	NEMA Outlets (100/110/115/120 VAC)		3+1 (Option)
Safety Conformance	Safety Standard		EN62040-1-1
	EMC		EN62040-2
	Marks		CE

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7—Legal Information

7.1—Limited Warranty

Power Innovations International, Inc., (hereafter “Power Innovations”) warrants this product to be free from defects in material and workmanship for a period of one year from the purchase date.

7.1.1—Shipment and Purchase Date

The purchase date will be determined only from the sales receipt or other proof of purchase provided by Power Innovations or other resellers.

7.1.2—Warranty Inclusions

The warranty also includes twelve-month coverage on parts only.

7.2—Part Replacement and Servicing

If any part or portion of the Power Innovations product fails to conform to the Warranty within the Warranty period, Power Innovations, at its option, will furnish new or factory remanufactured products for repair or replacement of that portion or part.

Replacement parts or unit may be new or refurbished and will meet specifications of the original parts or unit.

7.2.1—Restrictions

7.2.1.1—Unauthorized Service or Removed Serial Number

The product must not have been previously altered, repaired, or serviced by anyone other than a service facility authorized by Power Innovations to render such service, and the serial number of the product must not have been altered or removed.

7.2.1.2—Product Misuse or Abuse

In order to be covered by this warranty, the product will not have been subjected to accident, misuse or abuse, or operated contrary to the instructions contained in the User’s Manual. Any such conditions will void this warranty and the purchaser assumes all the expenses associated with the on-site visit, including travel expenses, parts and labor.

7.2.2—Legal Rights

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

7.2.3—Limitations of Coverage

This warranty is limited to the original purchaser of the product and is not transferable. This warranty covers only Power Innovations-supplied components. Service required as a result of third-party components is not covered under this warranty.

7.2.4—Proof of Purchase

Proof of purchase will be required by Power Innovations to substantiate date of purchase. Such proof of purchase must be an original bill of sale or receipt containing name and address of seller, purchaser, and the serial number of the product.

7.3—Warranty Claims

Within a reasonable time, but in no case to exceed thirty (30) days, after discovery of a defect, the purchaser shall contact Power Innovations at 801-785-4123. Subject to the limitations specified herein, a Power Innovations service representative will determine the appropriate course of action to repair the non-conforming product warranted hereunder.

7.3.1—On-site Visits

If it is determined that an on-site visit is needed to resolve the issue, Power Innovations will recommend a service visit by a Power Innovations representative or authorized service representative. It is the responsibility of the purchaser to cover the expenses of an on-site visit, excepting the cost of warrantied parts. Service contracts that include the cost of on-site visits can be purchased through Power Innovations Customer Service department.

7.3.2—Product Shipping

If it is determined that the product or a part must be shipped back to the manufacturer for repair, the purchaser will assume liability and pay for shipping to Power Innovations or an authorized service center. Power Innovations or an authorized service center will pay for shipping to return the repaired product to the customer.

7.3.2.1—Prior Approval

All products returned for service MUST have prior approval and an RMA number.

7.4—Limitation of Remedies

Power Innovations' entire liability and the User's exclusive remedy will be repair or replacement of the unit if all conditions described under "Limited Warranty" have been met. In no event will Power Innovations be liable for indirect, special, incidental, consequential, or exemplary damages of any kind whatsoever arising out of the use of this unit, including without limitation, lost profits, business interruption, or loss of data, whether any claim is based upon theories of contract, negligence, strict liability, tort, or otherwise.

8—Customer Service

The *INTegral* Line-Interactive UPS System is distributed by Power Innovations International, Inc. If there are any questions or comments about this product, please contact us:

Power Innovations International, Inc.
Tel: (801) 785-4123 **Fax:** (801) 785-6999
Web: http://www.power-innovations.com
E-mail: service@power-innovations.com

Direct any questions concerning the operation, repair or maintenance of this equipment to the Service Department of Power Innovations International:

8.1—Information to Provide

When making such an inquiry, provide the Service Department with the model number, serial number, and approximate date of receipt of the equipment.

8.2—Returning Equipment

If it is deemed necessary to return this equipment to the factory for servicing, contact the Service Department for authorization and an RMA number. It is often unnecessary to return a failed piece of equipment since this equipment uses plug-in type assemblies throughout.

8.3—Replacement Assemblies

Replacement assemblies for systems covered by this manual are usually in stock at the factory and available for immediate shipment.

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Version 1.0

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